

Lines, Angles and Triangles

Mathematics · Class 9 · Topic-wise Practice Worksheet

TIME 45 minutes	QUESTIONS 18	TOTAL MARKS 24	MAX. SCORE ___ / 24
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Name: _____ Class/Sec: _____ Date: _____

INSTRUCTIONS

- There are **18 questions** in this worksheet. All questions are compulsory.
- Each question has four options (A), (B), (C) and (D). Exactly **one** option is correct.
- Questions 1–15 carry **1 mark** each. Questions 16–18 (Achievers Section) carry **3 marks** each.
- There is no negative marking. Use of a calculator is **not** allowed.
- Figures are not drawn to scale unless stated. Rough work may be done at the side of each page.

Section A — Mathematical Reasoning

Q1–Q8 · 1 mark each

- The sum of the three interior angles of any triangle is _____.
 (A) 180° (B) 90°
 (C) 270° (D) 360°
- Two angles forming a linear pair add up to _____.
 (A) 45° (B) 90°
 (C) 180° (D) 360°
- When two straight lines intersect, the vertically opposite angles so formed are _____.
 (A) In the ratio 1 : 2 (B) Complementary
 (C) Always right angles (D) Equal
- Two angles of a triangle measure 40° and 75° . The third angle is _____.
 (A) 65° (B) 60°
 (C) 55° (D) 75°
- Each angle of an equilateral triangle measures _____.
 (A) 45° (B) 90°
 (C) 60° (D) 120°
- Which of the following is **not** a valid criterion for the congruence of two triangles?
 (A) SSS (B) SAS
 (C) ASA (D) AAA
- "Things which are equal to the same thing are equal to one another." In Euclid's system this statement is _____.
 (A) An axiom (B) A postulate
 (C) A theorem (D) A definition

8. The complement of an angle of 35° is _____.

(A) 35°

(B) 55°

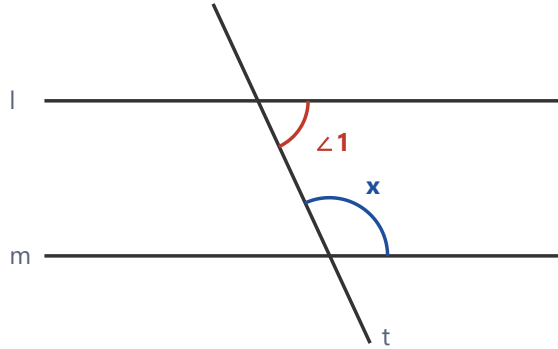
(C) 45°

(D) 145°

Section B — Everyday Mathematics and Reasoning

Q9–Q15 · 1 mark each

9. In the figure, line l is parallel to line m and t is a transversal. If $\angle 1 = 65^\circ$, then the value of x is _____.



Parallel lines l and m cut by the transversal t

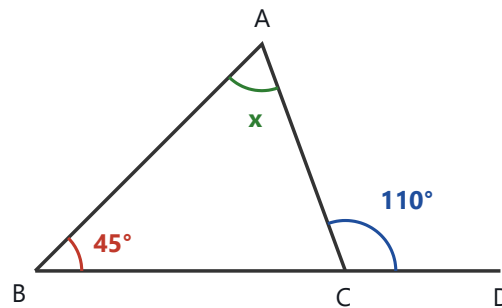
(A) 65°

(B) 105°

(C) 115°

(D) 125°

10. In the figure, side BC of $\triangle ABC$ is produced to D . If $\angle ABC = 45^\circ$ and the exterior angle $\angle ACD = 110^\circ$, then x = _____.



$\triangle ABC$ with side BC produced to D

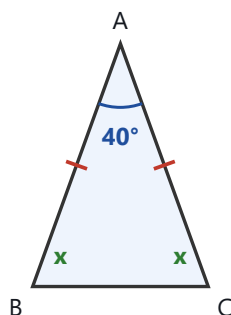
(A) 45°

(B) 55°

(C) 70°

(D) 65°

11. In the isosceles triangle shown, the two marked sides are equal and the vertex angle is 40° . Each base angle x measures _____.



Isosceles $\triangle ABC$ with $AB = AC$ and vertex angle 40°

- (A) 70° (B) 50°
(C) 40° (D) 80°
12. The angles of a triangle are in the ratio 2 : 3 : 4. The largest angle is _____.
(A) 40° (B) 80°
(C) 60° (D) 90°
13. In $\triangle ABC$ and $\triangle PQR$ it is given that $AB = PQ$, $\angle B = \angle Q$ and $BC = QR$. The two triangles are congruent by which criterion?
(A) SSS (B) ASA
(C) SAS (D) RHS
14. One row of the table below is **incorrectly** matched. Which row is it?

Row	Pair of angles	Property
(A)	Linear pair	Adjacent angles adding to 180°
(B)	Complementary angles	Two angles adding to 180°
(C)	Vertically opposite angles	Always equal to each other
(D)	Alternate interior angles	Equal when a transversal cuts parallel lines

Table 4.1 — Pairs of angles and their properties

- (A) (A) (B) (B)
(C) (C) (D) (D)
15. Two supplementary angles are in the ratio 4 : 5. The smaller angle is _____.
(A) 72° (B) 100°
(C) 90° (D) 80°

Achievers Section

Q16–Q18 · 3 marks each

16. In $\triangle ABC$, $\angle A = 70^\circ$. The bisectors of $\angle B$ and $\angle C$ meet at O. The measure of $\angle BOC$ is _____.
(A) 125° (B) 115°
(C) 110° (D) 140°
17. Which of the following sets of lengths **cannot** be the three sides of a triangle?
(A) 6 cm, 8 cm, 10 cm (B) 5 cm, 7 cm, 13 cm
(C) 4 cm, 4 cm, 7 cm (D) 9 cm, 12 cm, 15 cm

18. Consider the three statements below.

- (i) If two triangles have equal areas, they must be congruent.
- (ii) Two lines that are each perpendicular to the same line are parallel to each other.
- (iii) In a triangle, the side opposite the greater angle is the longer side.

Which of them are **true**?

(A) (i) and (ii) only

(B) (ii) and (iii) only

(C) (i) and (iii) only

(D) All three

Answer Key

1	A	2	C	3	D	4	A	5	C
6	D	7	A	8	B	9	C	10	D
11	A	12	B	13	C	14	B	15	D
16	A	17	B	18	B				

Solutions

1. Answer: (A) 180°

By the angle sum property, the three interior angles of a triangle always add up to **180°** . Drawing a line through one vertex parallel to the opposite side shows the three angles together forming a straight angle.

2. Answer: (C) 180°

In a linear pair the two angles are adjacent and their non-common arms form a straight line, so together they make a straight angle of **180°** .

3. Answer: (D) Equal

Each of the two vertically opposite angles makes a linear pair with the same adjacent angle, so both equal 180° minus that angle. Hence vertically opposite angles are always **equal**, whatever the angle of intersection.

4. Answer: (A) 65°

The three angles add to 180° , so the third angle is $180^\circ - (40^\circ + 75^\circ) = 180^\circ - 115^\circ = \mathbf{65^\circ}$.

5. Answer: (C) 60°

All three sides are equal, so all three angles are equal. Since they total 180° , each one is $180^\circ \div 3 = \mathbf{60^\circ}$.

6. Answer: (D) AAA

Three equal angles fix only the *shape*, not the size — a small triangle and a large one can have identical angles. So **AAA** gives similarity, not congruence. SSS, SAS, ASA (and RHS for right triangles) do guarantee congruence.

7. Answer: (A) An axiom

Euclid called the self-evident truths assumed across *all* of mathematics axioms (or common notions), and this is the first of them. Assumptions specific to geometry, such as “a straight line may be drawn from any point to any other point”, he called postulates. A theorem, by contrast, must be proved.

8. Answer: (B) 55°

Complementary angles add to 90° , so the complement is $90^\circ - 35^\circ = \mathbf{55^\circ}$. (145° would be the supplement, since supplementary angles add to 180° .)

9. Answer: (C) 115°

$\angle 1$ and x both lie between the two parallel lines and on the same side of the transversal, so they are co-interior (allied) angles and add to 180° . Hence $x = 180^\circ - 65^\circ = \mathbf{115^\circ}$.

10. Answer: (D) 65°

An exterior angle of a triangle equals the sum of the two interior opposite angles, so $110^\circ = x + 45^\circ$, giving $x = \mathbf{65^\circ}$. Checking the third angle: $\angle ACB = 180^\circ - 110^\circ = 70^\circ$, and $65^\circ + 45^\circ + 70^\circ = 180^\circ$.

11. Answer: (A) 70°

Angles opposite equal sides are equal, so both base angles equal x . From the angle sum property, $40^\circ + x + x = 180^\circ$, so $2x = 140^\circ$ and $x = \mathbf{70^\circ}$.

12. Answer: (B) 80°

Let the angles be $2k$, $3k$ and $4k$. Then $2k + 3k + 4k = 180^\circ$, so $9k = 180^\circ$ and $k = 20^\circ$. The angles are 40° , 60° and 80° , so the largest is **80°** .

13. Answer: (C) SAS

Two pairs of sides are equal and the equal angles lie *between* those sides in each triangle, which is exactly the side-angle-side pattern. So the triangles are congruent by **SAS**. Had the equal angle not been the included one, congruence would not follow.

14. Answer: (B) (B)

Complementary angles add to 90° , not 180° — angles adding to 180° are supplementary. So row **(B)** is the incorrect one. The other three descriptions are accurate.

15. Answer: (D) 80°

Let the angles be $4k$ and $5k$. Supplementary means $4k + 5k = 180^\circ$, so $9k = 180^\circ$ and $k = 20^\circ$. The angles are 80° and 100° , so the smaller is **80°** .

16. Answer: (A) 125°

Since $\angle B + \angle C = 180^\circ - 70^\circ = 110^\circ$, the two half-angles satisfy $\frac{\angle B}{2} + \frac{\angle C}{2} = 55^\circ$. In $\triangle BOC$ the angle sum gives $\angle BOC = 180^\circ - 55^\circ = \mathbf{125^\circ}$. In general $\angle BOC = 90^\circ + \frac{\angle A}{2}$, and $90^\circ + 35^\circ = 125^\circ$ agrees.

17. Answer: (B) 5 cm, 7 cm, 13 cm

A triangle exists only if the sum of any two sides exceeds the third. For **5, 7 and 13**: $5 + 7 = 12$, which is less than 13, so the two shorter sides cannot meet — no such triangle exists. The other three sets pass the test ($6 + 8 > 10$, $4 + 4 > 7$, $9 + 12 > 15$).

18. Answer: (B) (ii) and (iii) only

Statement (i) is false: a triangle with base 8 and height 3 has the same area as one with base 6 and height 4, yet the two are not congruent. Statement (ii) is true, since both lines make 90° with the same transversal, making corresponding angles equal. Statement (iii) is true and is the standard inequality relating sides and angles. So only **(ii) and (iii)** hold.